U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Heterelmis stephani*

COMMON NAME: Stephans riffle beetle

LEAD REGION: Region 2

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: 11 May 2004
__ 90-day positive - FR date:
__ 12-month warranted but precluded - FR date:
__ Did the petition requesting a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? Yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.
We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements; meeting statutory deadlines for petition findings or listing determinations; emergency listing evaluations and determinations; and essential litigation-related administrative and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists" in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).
___ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): 2002

___ Candidate removal: Former LP: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insects, Elmidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Arizona

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Arizona

LAND OWNERSHIP: The entire range of this species is believed to be confined to Madera Canyon which is located in the Coronado National Forest.

LEAD REGION CONTACT: Susan Jacobsen, 505-248-6641

LEAD FIELD OFFICE CONTACT: Arizona Ecological Services Field Office, Mike Martinez, 602-242-0210 ext. 224

BIOLOGICAL INFORMATION: *Heterelmis stephani* is an endemic riffle beetle found in isolated spring environments within the Santa Rita Mountains, Pima County, Arizona. Stephans riffle beetle was fully described in 1972 from 71 specimens collected in 1969 from Bog Spring in Madera Canyon (Brown, 1972a). The beetle is also known from Sylvester Spring in Madera Canyon, and based on relatively intensive surveys of the surrounding area, the entire range of this species is believed to be confined to this canyon (Barr, 1991; Barr and Shepard, 1993). To summarize, historically only three populations, including Bog and Sylvester Springs and an area where water was being diverted from Bog Springs (see factor A. below), have been documented. The population being maintained by seepage from a water tank is no longer extant since water ceased flowing from the tank in 1976.

Beetles of the family Elmidae gain their common name riffle beetle from their propensity to be found living in shallow streams, rapids, or other comparable lotic situations. The springs can be described as a typical isolated, mid-elevational, permanently saturated, spring-fed aquatic climax community that is commonly referred to as a ciénega (Hendrickson and Minckley, 1985). Elmid larvae are strictly aquatic and respiration occurs through rectractile cloacal tracheal gills (Brown,

1983). Riffle beetles attach their eggs to the underside of submerged rocks, woody debris, or aquatic plants (Brown, 1987). Life histories of elmids are quite variable with a short incubation period and a larval stage lasting from 6 to 36 months (Tavares and Williams, 1990).

Upon reaching maturity, riffle beetle larvae crawl out of the aquatic environment to pupate under cover of sand, rock, bark, or other debris (Brown, 1972b; Brown, 1983). In temperate zones, pupation typically requires 1-2 weeks and occurs from late spring through summer (Brown, 1987). After emergence, adults commonly fly and may be attracted to lights during their sole dispersal flight (Brown, 1983, 1987). Adults are small, typically less than 3 mm in total length (Brown, 1983). Upon reentering the aquatic environment, most elmid adults never again leave the water (Brown, 1987). Respiration for adults occurs through the use of a plastron (a semipermanent bubble of air through which respiratory gases are exchanged in some aquatic invertebrates) (Brown, 1972). Riffle beetle diet consists of microorganisms and debris, such as diatoms and detritus, scraped from substrate surfaces (Brown, 1987; Tavares and Williams, 1990).

An interesting and important note about riffle biology is that these organisms are suspected of possessing some sort of chemical defense that readily repels diverse types of predators (Brown, 1987). There are also accounts of indigenous peoples of Lima, Peru, who utilize beetles of the elmid family as a food seasoning (Brown, 1987). The potential medicinal value of elmids has not been explored.

THREATS

A. <u>The present or threatened destruction, modification, or curtailment of its habitat or range</u>. The springs where Stephans riffle beetle is known to occur no longer exist within their natural condition. All have been boxed, capped, or channeled into pipes (Barr, 1991). Concrete boxes were constructed around the spring heads in the 1930s by the Civilian Conservation Corps (Barr and Shepard, 1993). The most significant habitat losses occurred after the species was originally described.

The type locality, where the species was originally collected, no longer exists as habitat for the species (Barr and Shepard, 1993). After conferring with the original collector, Barr and Shepard (1993) determined that the type locality was not Bog Spring but actually a site 1.5 miles away near a U.S. Forest Service (USFS) campground. Apparently the original population was maintained by seepage from a pipe which was believed to be overflow seepage from a nearby tank which stored water diverted from Bog Spring. Seepage from the tank ceased in 1976 and the tank was removed entirely in 1992 (Barr and Shepard, 1993).

During the surveys conducted by Barr and Shepard (1993) only one adult riffle beetle was collected from Sylvester Spring. They were unable to find the beetle in Bog Spring proper. Based on the 71 beetle specimens originally collected in 1969, Barr and Shepard (1993) believe the species was very common. The subsequent loss of habitat at the type locality has eliminated what was likely a significant population of Stephans riffle beetle.

B. <u>Overutilization for commercial, recreational, scientific, or educational purposes</u>. Not known

to be a factor threatening Stephan's riffle beetle.

C. Disease or predation. Not known to be a factor threatening Stephan's riffle beetle.

D. The inadequacy of existing regulatory mechanisms. The documented loss of habitat and extirpation of a population of Stephans riffle beetle, demonstrates the need to develop a conservation program in coordination with the USFS. We know of no state or local government programs structured to address the conservation of rare and imperiled insects. The Arizona Game and Fish Department does not have jurisdiction over insects. The authority lies with the Arizona Department of Agriculture, which does not have an insect conservation program.

E. Other natural or manmade factors affecting its continued existence. Bog Spring and Sylvester Spring are located immediately off a Forest Service maintained recreational trail. Due to the relatively obscure nature of the beetle's existence, it is unlikely that recreationists are entirely aware of the sensitive nature of those spring ecosystems. In the absence of public education, recreationists may unwittingly degrade habitat by introducing chemicals or allowing pets into the springs. The unintentional killing of larvae may also occur as a result of trampling.

Endemic spring-dependent organisms whose populations exhibit a high degree of geographic isolation are extremely susceptible to stochastic extinction resulting from catastrophic natural disasters such as fires, floods, or changes in spring water chemistry.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED: No conservation activities have been initiated.

SUMMARY OF THREATS: The springs where Stephans riffle beetle is known to occur no longer exist within their natural condition. All have been boxed, capped, or channeled into pipes.

For species that are being removed from candidate status:
___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES: Evaluate habitat needs and develop appropriate conservation actions.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus Species	1 2

	Non-imminent	Subspecies/population Monotypic genus **Species** Subspecies/population	3 4 **5*** 6
Moderate to Low	Imminent Non-imminent	Monotypic genus Species Subspecies/population Monotypic genus Species Subspecies/population	7 8 9 10 11 12

Rationale for listing priority number:

Magnitude: All springs that the species is known from have been modified in some manner. One site has been entirely dewatered, resulting in localized extirpation. The springs are currently maintained in modified conditions.

Imminence: Because the most recent surveys for the species are nearly a decade old, it is difficult to ascertain the current status of the species populations. Therefore, we cannot conclude that extinction is imminent.

_X_ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes

Is Emergency Listing Warranted? No, because the USFS has no current plans to modify remaining habitat.

DESCRIPTION OF MONITORING: We have informally contacted the USFS and expressed an interest in developing a candidate conservation agreement for this species. We have also contacted the Arizona Department of Agriculture and expressed an interest in developing an agreement that would allow us to award Section 6 dollars to the state of Arizona for insect conservation. No progress has been made. We continue to search the scientific literature for information concerning this species but no new literature has been forthcoming for this species.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: None.

Indicate which State(s) did not provide any information or comments: We know of no state or local government programs structured to address the conservation of rare and imperiled insects in Arizona.

LITERATURE CITED

Barr, C.B. 1991. Personal letter to Robert A. Johnson regarding the distribution and status of

Heterelmis stephani, dated December 19, 1991.

Barr, C.B. and W.D. Shepard. 1993. Survey for *Heterelmis stephani* Brown (Insecta: Coleoptera: Elmidae) in Madera Canyon and other localities in the Santa Rita Mountains, Arizona. Final Report prepared for U.S. Forest Service. 48 p. August 14, 1993.

Brown, H.P. 1972a. Synopsis of the genus Heterelmis Sharp in the United States, with a description of a new species from Arizona (Coleoptera, Dryopoidea, Elmidae). Entomological News. 83: 229-238.

Brown, H.P. 1972b. Biota of freshwater ecosystems. Identification Manual No. 6. Aquatic Dryopoid beetles (Coleoptera) of the United States. Prepared by H.P. Brown, University of Oklahoma for the Environmental Protection Agency. April 1972.

Brown. H.P. 1983. A catalog of the Coleloptera of America north of Mexico. United States Department of Agriculture. Agriculture Handbook Number 529-50. Prepared by Agricultural Research Service. November 1983. 21 p.

Brown, H.P. 1987. Biology of riffle beetles. Ann. Rev. Entomol. 32: 253-73.

Hendrickson, D.A. and W.L. Minckley. 1985. Ciénegas - Vanishing climax communities of the American southwest. Desert Plants 6(3). The University of Arizona. 175 pp.

Shepard, W.D. 1992. Riffle beetles (Coleoptera: Elmidae) of Death Valley National Monument, California. Great Basin Naturalist. 52(4), pp. 378-381.

Shepard, W.D. 1993. Desert springs - both rare and endangered. Aquatic Conservation: Marine and Freshwater Ecosystems. Vol. 3, 351-359.

Tavares, A.F. and D.D. Williams. 1990. Life histories, diet, and niche overlap of three sympatric species of Elmidae (Coleoptera) in a temperate stream. Can. Ent. 122: 563-577.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Rich McDonald 11/17/2005
Acting Regional Director, Fish and Wildlife Service Date

Concur: August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur:
Director, Fish and Wildlife Service Date

Date of annual review: October 2005
Conducted by: Mike Martinez